

## Quality Standardization of Flowers of *Nyctanthes arbor-tristis* Linn.

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### ABSTRACT

Harsinghar/Parijataka is a sacred plant grown near the temples as well as in residential areas in India. Each and every part of the plant is used as medicine by the aboriginals. It is botanically known as *Nyctanthes arbor-tristis* L. from family Oleaceae. The stem bark and leaves have been studied in details. Although the flowers of parijataka have curative properties in inflammations, ophthalmopathy, flatulence, colic etc. the study is lacking. Hence it was felt necessary to put forth the pharmacognostical standards for the said flower. The present work involves the macroscopic, microscopic and histochemical studies of petals and corolla tubes. The entire flower was investigated for powder microscopy, fluorescence, physicochemical and qualitative phytochemical analysis. Thus these standards will be of utmost important in identification of *Nyctanthes arbor-tristis* flower.

**Keywords:** *Nyctanthes arbor-tristis*, Harsinghar/Parijataka, flower, Pharmacognosy.

### INTRODUCTION

*Nyctanthes arbor-tristis* L., popularly known as Parijataka, Night Jasmine or Harsinghar belong to family Oleaceae. It is commonly cultivated sacred tree for its sweet scented flowers. Each and every part of the plant is of medicinal value. The flowers are bitter, astringent, ophthalmic, stomachic and carminative<sup>1,2</sup>. They are useful in inflammations, ophthalmopathy, flatulence, colic, dyspepsia, splenomegaly, greyness of hair and baldness<sup>3,4</sup>. The oil is extracted from the flower and used in perfumery. The *Nyctanthes arbor-tristis* is a hardy small tree, often growing up to 5 – 10 m high, with drooping branches and quadrangular branchlets. Flowers are fragrant. The flower inflorescence is trichotomous cymes. Each flower is bracteate, actinomorphic, bisexual, hypogynous and pentamerous. Calyx consists of 5 sepals, gamosepalous, minute, persistent, triangular tips, 0.5-0.6cm in length. The Corolla is five in number, gamopetalous with white petals and orange corolla tube. Capsule sub-orbicular and compressed<sup>5,6</sup>. It is native of India, occur wild in sub-Himalayan ranges from Chenab to Nepal, Central India and Southwards to Godavari. Most commonly cultivated in India as well as in all tropical countries<sup>7,8</sup>. In, spite of the numerous medicinal uses attributed by the flowers. The flower of Harsinghar is not been studied. Therefore there is a need to put forth the pharmacopoeial standards for the flower. Hence the present investigation includes macroscopic, microscopic, histochemical evaluation, fluorescence study, determination of physicochemical constants and preliminary phytochemical screening of *Nyctanthes arbor-tristis* flower (Corolla).

### MATERIALS AND METHODS

The matured flowers of *Nyctanthes arbor-tristis* were procured from Bhayandar and Malad, regions of Mumbai. The botanical identity was confirmed from Botanical Survey of India, Pune. Flowers were subjected to shade drying. The dried flower was ground into powder which was sieved through mesh no. 710 with 0.710 mm size of aperture. The voucher specimens of the authentic drug were deposited at Research Laboratory, Botany Department, Mithibai College.

Macroscopy of fresh flower i.e. petals and corolla tube was studied<sup>9,10</sup>. For microscopic inspection hand cut transverse sections of petals and corolla tube were taken and stained with safranin. Photomicrographs were obtained of the sections<sup>11,12</sup>. Histochemical analysis was done by staining the hand cut sections with different reagents<sup>13</sup>. The dried flower were powdered and treated with chloral hydrate solution followed by staining in 1% safranin stain for 5-10 minutes and mounted in 50% glycerine<sup>14</sup>. Fluorescence analysis of the flower were performed using various reagents and was observed under U.V. and ordinary light<sup>15,16</sup>. Various physicochemical parameters like ash values (Total ash and acid insoluble ash) and extractive values (water and alcohol soluble extractives) were established using powder drug<sup>17,18</sup>. Preliminary phytochemical screening, a known quantity of dried powder was extracted with water, alcohol and chloroform<sup>19,20</sup>. These were tested for different constituents.

### RESULTS

#### *Macroscopy of petals and corolla tube*

As per the folklore uses the corolla of the flower was only studied for the current investigation. The corolla consist of petals (Limb) and the corolla tube. The Corolla tube is

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Figure 1: flowers of *Nyctanthes arbor-tristis*.

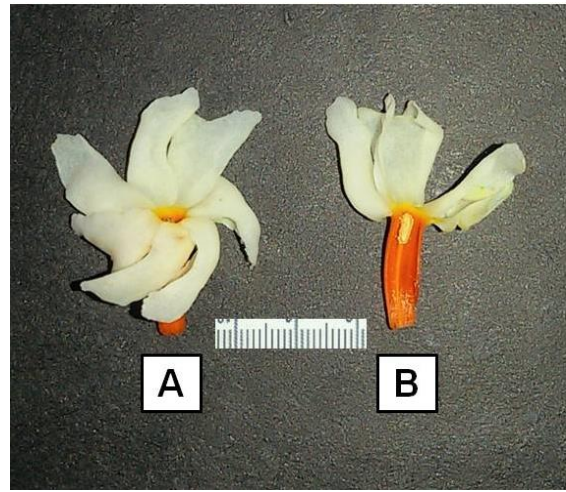


Figure 2: flower; A- entire flower, B- L.S. of flower.

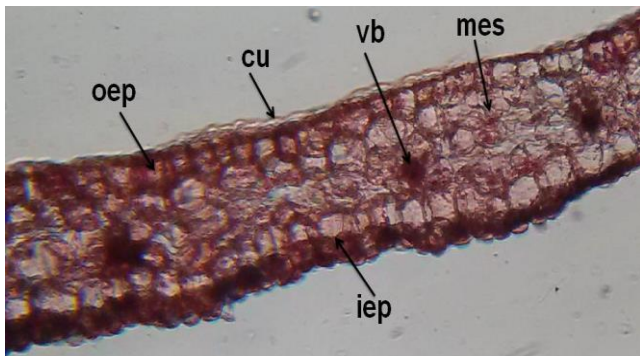


Figure 3: T.S. of flower passing through petals, oep-outer epidermis, cu-cuticle, mes-mesophyll tissue, vb- vascular bundle, iep- inner epidermis.

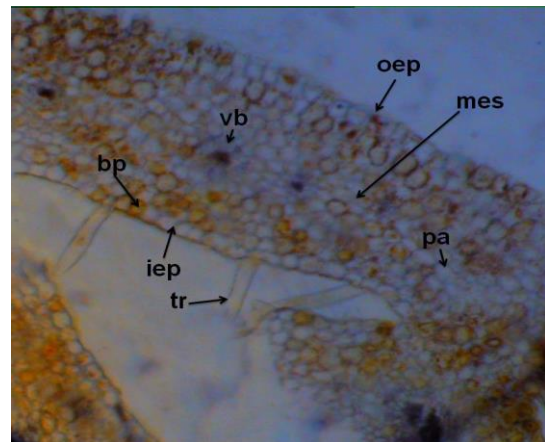


Figure 4: T.S. of flower passing through corolla tube, oep-outer epidermis, cu-cuticle, mes-mesophyll tissue, vb-vascular bundle, bp – brown pigment, pa – parenchyma cell, tr – trichome. iep- inner epidermis.

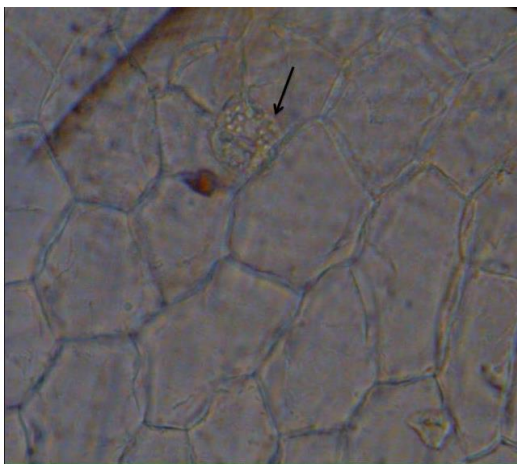


Figure 5: Anomocytic stomata.



Figure 6: Powder microscopy showing trichome and brown pigment.

bright orange with five white petals; corolla tube 0.9 – 1cm length, petals 1.4-1.5 cm in length, the margins of petal curl downwards, tips notched. The throat of the corolla shows orange centre. The androecium is with two

stamens inserted near the top of corolla tube. The flower has sweet aromatic odour and bitter taste. (Figures 1, 2)

*Microscopy of petals and corolla tube*  
*T.S. of flower passing through petals (Limb)*  
*Outer epidermis*

Table 1: Histochemical analysis of *Nyctanthes arbor-tristis* flower.

Tests	<i>Nyctanthes arbor-tristis</i>	
	Petals	Corolla tube
Starch	Absent	Absent
Mucilage	Absent	Absent
Tannins	Absent	Present
Cellulose	Present	Present
Pectin	Present	Present
Lignin	Present	Present
Lipids	Present	Present
Calcium oxalate crystals	Absent	Present
Oils	Present	Present
Protein	Present	Present
Suberin	Absent	Absent

Table 2: Fluorescence analysis of *Nyctanthes arbor-tristis* flower.

Test	<i>Nyctanthes arbour-tristis flower</i>		
	Visible	Short	Long
1	Brown	Light green	Dark green
2	Dark yellow	Dark green	Greenish purple
3	Brown	Light green	Purple green
4	Yellow	Greenish yellow	Dark green
5	Light brown	Light green	Dark green
6	Yellow	Yellowish green	Dark purple
7	Yellowish brown	Light green	Purple green
8	Yellow	Light green	Yellowish green
9	Yellow	Light green	Dark green

Table 3: Physicochemical analysis *Nyctanthes arbor-tristis* flower.

Ash values	Total ash	w/w not > than 3.3 %
	Acid insoluble ash	w/w not > than 1.45 %
	Water soluble ash	w/w not > than 1.9 %
Extractive values	Water extractive	w/w not < than 22.5%
	Alcohol extractive	w/w not < than 15.5%
	Chloroform extractive	w/w not < than 11.2 %

It is tangentially elongated (15 – 22.5  $\mu\text{m}$  in length and 45 – 48  $\mu\text{m}$  in breadth) compactly arranged covered with thick cuticle and is papillose. Few cells are larger than the others. The outer epidermis is interrupted by anomocytic stomata. The frequency of stomata is more on outer epidermis than the inner epidermis.

#### *Mesophyll region*

It is thin layer and consists of three layers of parenchymatous cells, (30 - 45  $\mu\text{m}$  in diameter) with intercellular space and poorly developed vascular bundles

at intervals. The cells are filled with abundant oil globules.

#### *Inner epidermis*

It is warty, with compactly arranged cells covered with cuticle (30 $\mu\text{m}$  in length and 30 - 45  $\mu\text{m}$  in breadth). The inner epidermis also shows presence of anomocytic stomata. (Figure 3)

#### *T.S. of flower passing through corolla tube*

#### *Outer epidermis*

It is single layered compactly arranged (15 – 22.5  $\mu\text{m}$  in length and 30  $\mu\text{m}$  in breadth) and covered with thick cuticle. Few of the cells are pigmented.

#### *Mesophyll region*

It is made up of polygonal to polyhedral parenchymatous cells arranged (15 – 30  $\mu\text{m}$  in diameter). Many of the cells are filled with amber coloured granular deposits. It also possesses prismatic calcium oxalate crystals, tannins and oil globules. Vascular bundles are present at intervals with xylem and phloem.

#### *Inner epidermis*

The cells of inner epidermis is compactly arranged and covered with cuticle. The corolla tube on the outer side is smooth walled but the tube at the inner side is rough due to the presence of unicellular trichomes. Few cells enlarge and form a parenchymatous appendage with vascular bundle. (Figure 4)

#### *Histochemical tests*

The histochemical analysis using various reagents showed presence of primary and secondary metabolites as given in table 1.

#### *Powder study*

The flower powder is orange red in colour, with bitter taste and aromatic odour. In microscopic study, it shows non-glandular unicellular trichomes, tannin filled cells, anomocytic stomata, oil globules, pollen grains and amber coloured pigments. (Figures 5 and 6)

#### *Fluorescence analysis*

The powder shows very significant characteristic fluorescence. Observations are recorded in table 2.

#### *Physicochemical studies*

Air-dried powdered flower of *Nyctanthes* was subjected to physicochemical analysis. The results obtained are mentioned in table 3.

#### *Preliminary phytochemical screening*

The ethanol, chloroform and water extracts revealed the presence of various active constituents as shown in table 4.

## DISCUSSION

Through the present work, pharmacopoeial standards for flowers of *Nyctanthes arbor-tristis* are laid down for the first time. Macroscopic observations are useful for gross identification of the drug. Anatomical features like unicellular trichomes, papillose outer epidermis, and oil globules are of significance in recognition of floral parts. Authentication of powdered drug can reliably done on the basis of diagnostic characters of anomocytic stomata, brown pigmented cells etc. Fluorescence analysis and physicochemical parameters of ash and extractive values are of help in detection of adulteration if any. The

Table 4: Preliminary phytochemical screening of *Nyctanthes arbor-tristis* flower.

Sr. No.	Phytoconstituents	Tests	WE	AE	CE
1.	Reducing sugars	Fehling's test	+	+	+
		Benedict's test	+	+	+
2.	Mucilage	Ruthenium red test	-	-	-
3.	Alkaloids	Wagner's test	+	+	+
		Dragendorff's test	+	+	+
		Mayer's test	+	+	+
		FeCl <sub>3</sub> test	+	+	-
4.	Tannins	Lead acetate test	+	+	-
5.	Cardiac glycosides	Kellar-Killani test	+	+	+
6.	Cyanogenetic glycosides	Guignard test	-	-	-
7.	Anthraquinone glycosides	Borntrager's test	+	+	+
8.	Steroids	Lieberman-Burchard's test	-	-	-
9.	Proteins	Millon's test	+	+	+
10.	Terpenoids	Salkowski test	+	+	-
11.	Flavonoids	Shinoda test	+	+	+
12.	Saponins	Foam test	+	-	-
13.	Starch	Iodine test	-	-	-

Key: WE – Water Extract, AE – Alcohol Extract, CE – Chloroform Extract, '+' Present, '-' Absent

qualitative phytochemical and histochemical screening revealed the presence of diverse types of phytochemicals namely, alkaloids, tannins, terpenoids, flavonoids, saponins, essential oil etc. They give clue about therapeutic potential of the drug. In brief, all these findings are highly essential for the drug manufacturers in thorough assessment of quality drug.

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